REMARKS/ARGUMENTS

Formal drawings are enclosed. While the Office has not called for replacement drawings, the enclosed drawings are formal drawings prepared for a counterpart PCT application and are to replace the drawings as filed.

Claims 1-19 are pending in the application. All the claims stand rejected. The Examiner has rejected claims 1-10 and 12-13 as being anticipated by Spear, Jr. et al U.S. Patent 5,863,671. Additionally, the Examiner has rejected claims 1-3 and 5 as being anticipated under 35 U.S.C. 102(e) in view of Hatoh et al. U.S. Patent 6,361,236.

A number of the claims stand rejected under 35 U.S.C. 103(a). Claim 11 has been rejected as being unpatentable over Spear, Jr. et al. '671 in view of applicants own disclosure. Claim 14 has been rejected as being unpatentable over Spear, Jr. et al. '671 patent as applied to claim 13, and further in view of Landau et al. '151. Finally, claims 15-19 have been rejected further in view of the disclosure in Nolscher et al. '554 and DuBose '385.

As is explained in detail below, the prior art as cited by the Examiner is concerned with conventional configurations of fuel cell stacks. It is now fairly common to configure fuel cell stacks as a plurality of plates, to maximize the volumetric efficiency of the fuel cell stack. In order to provide full power for the necessary fluids, it is again common to provide ports or passages extending perpendicularly through the individual plates, with there usually being six ports or passages comprising a pair of passages for coolant supply and return, a pair of passages for oxidant supply and return and a pair of passages for fuel supply and return. The individual plates are then configured to provide connections to the appropriate pairs of passages for channels on the plates for fuel gas, oxidant and coolant.

Such an arrangement is concerned solely with supply of the various fluids to the fuel cell stack and distributing fluids to the appropriate channels within the fuel cell stack. It nowhere addresses the issue of connecting a fuel cell stack to external peripheral components, such as heaters, humidifiers and the like.

Accordingly, claim 1 has been amended to make it clear that the present invention is concerned with a fuel cell stack comprising a plurality of fuel cells. Additionally, to further distinguish the manifold of the present invention, from theoretical interpretation of a "manifold" in the cited art, it is now specified in claim 1 that the manifold body includes at least one passage extending transversely, i.e. in the plane of a plate of the manifold (where a plate is provided), to connect together a pair of ports that are otherwise offset from one another. In this respect, to ensure consistency between the language of the claims and the description, paragraph 46 of the description has been amended to include similar language; no new matter has been added.

Turning to the Examiner's rejection of the claims and first to the rejection under 35 U.S.C. 102(b) in view of the Spear, Jr. et al. '671 patent, this patent is concerned with a wholly different approach to distributing operating fluids to a fuel cell stack and to providing the necessary additional functions for a stack to operate successfully. As is known, in constructing a workable fuel cell power plant, the fuel cell stack needs to be equipped with what is often referred to as "balance of plant" (BOP). Thus, it is commonly necessary to adjust the temperature of incoming gases for the reaction and to adjust their humidity levels. Additionally, as any reaction in a fuel cell stack is never one hundred percent efficient, usually a coolant flow is provided to discharge waste heat from the stack and to maintain the stack at a desired operating temperature.

In this '671 patent, the intention is not to provide some improved manifold for connecting the exterior of a complete fuel cell stack to such a balance of plant, but rather the intention is to incorporate, to the largest extent possible, common peripheral devices within the stack. As such, this patent, it is submitted, teaches directly away from the present invention.

As Figure 1 shows, in a schematic fashion, the intention is simply to provide wholly conventional connections for the process gases and the cooling fluid to the individual cells. Figure 4a, cited by the Examiner, shows schematically the various flow connections and paths, and one can note Figure 5 showing in greater detail how these various functions are combined into a single cell. Figure 9 shows, in an isometric

view, a part of the fuel cell stack. The flow connections are, in many senses, largely conventional. Thus, there are openings F8 and F9 for hydrogen, F12 and F13 for air as the oxidant, F10, F11 for water as a coolant (the circular openings F16 are for tie rods). These rectangular openings F8-F13 are provided in each plate, so as to provide ducts extending perpendicularly through the various plates, to enable communication of the various flow channels, etc. to selected ducts, in known manner.

As the view of Figure 3 and elsewhere shows, the intention is to combine, within each cell, functions beyond the basic fuel cell function, e.g. to include heat transfer, humidification and the like.

With respect to external connections to any peripheral balance of plant and devices, the '671 patent is entirely silent. Thus, as Figure 9 and elsewhere shows, it simply provides conventional ducts extending perpendicularly through the fuel cell stack. There is no teaching as to how these ducts would be connected to any external devices, and certainly no teaching of any specific manifold configuration for achieving this. Indeed, with humidification, etc. provided internally, there is no need for such external peripheral components.

The Examiner's reference to Figure 4a and the associated description merely emphasizes that this patent is concerned with providing the functions within each fuel cell. To repeat, this teaches away from the present invention, and nowhere does this patent address providing connections externally of a complete stack.

In contrast, the present invention has claims that specifically define a manifold, for use with a fuel cell stack having a plurality of fuel cells, with the manifold itself providing no fuel cell functions. Further, to distinguish from the common configuration where ducts merely extend perpendicularly through fuel cell plates, it is specified that the manifold include at least one passage that extends transversely across the manifold. Thus, in the manifold of the present invention there is no requirement that the two sets of ports be in any way aligned with one another. Indeed, exactly the opposite is the case; the manifold is intended to allow complete freedom in placing of the various ports, to optimize mounting of the various balance of plant peripheral components.

Turning to the rejection under 35 U.S.C. 102(e) of claims 1-3 and 5 by Hatoh et al. It is not seen that this patent is in any way anticipatory of the present invention. Again, what is taught in Hatoh is an entirely conventional arrangement for a fuel cell stack. Importantly, it is to be noted that the elements shown in Figure 2 of Hatoh are not simply manifold elements, i.e. elements serving to do nothing more than communicate fluids between various ports, but rather are the actual active components of the fuel cell, namely: a separator plate 4a with a cooling flow path 7 on one side and a gas flow path 6 on the other; a separator plate 4b with gas flow paths 5, 6 on either side; and a separator plate 4c with a gas flow path 5 on one side and a cooling water path on the other side.

Accordingly, it is submitted that the structure shown in Hatoh et al. is not a manifold, but rather is a fuel cell forming part of a fuel cell stack. Additionally, it does not provide the manifold functions of the present invention. Thus, while there may be apertures 8 that are aligned to form ducts extending through the fuel cell stack, they do not provide the manifold functions in the present invention. Thus, in the manifold of the present invention, the ports on the exterior of the manifold include at least one pair of ports that are offset from one another and the manifold has at least one passage that extends transversely within the manifold to connect the ports. Again, the manifold of the present invention provides just a manifold function, for connection to a fuel cell stack as a whole, and does not provide the functions of a fuel cell stack.

With respect to the rejection of claim 11, in view of the rejection of this claim under 35 U.S.C. 112, this claim has been deleted.

With respect to claim 13, the Examiner further relied upon Landau et al. for teaching the provision of heat exchangers in the coolant loop. However, as noted above, the basic teaching in Spear, Jr. et al. is to provide the heat exchange function within each individual fuel cell. Accordingly, there is simply no reason or basis for a notional skilled person to consider providing Spear, Jr. et al. with connections to some external heat exchanger. It is therefore submitted that claim 14 is allowable.

With respect to claims 15-19, the Examiner further relied upon DuBose for teaching the provision of humidifiers and Nolscher et al. for teaching the use of oxidant

and fuel heat exchangers. The fact that the Examiner has to rely on these two references for these additional elements merely emphasizes the difference in the techniques between Spear, Jr. et al. and the present invention. Thus, the Spear, Jr. et al. disclosure teaches that the humidification and heat exchange functions be provided within each fuel cell, and consequently there is no teaching of the provision of any external humidifiers or heat exchangers, and there is no reason or basis to consider providing these components externally.

Accordingly, this reference teaches away from the present invention.

While the DuBose and Nolscher et al. references may teach the provision of some standard, external peripheral devices, they are noteworthy for being equally silent on the issue of any manifold connection between such peripheral devices and the fuel cell stack itself.

In summary, it is submitted that the prior art as a whole is silent on the provision of any manifold whose prime or sole function is to provide a connection between a fuel cell stack and a number of external peripheral devices that provide the necessary balance of plant to run the fuel cell stack. Accordingly, it is submitted that the claims as amended are allowable.

Early review and allowance are requested.

Respectfully submitted,

BERESKIN & PARR

By _____

Reg. No. 31,696
Tel: 416-957-1687

Attachments

Replacement Sheet

Formal Drawings including Figures 1-8B are Attached.